

Claims

1. A process for the hydrometallurgical processing of manganese containing materials, the process characterised by the combination of a manganese dioxide containing feedstock and an acidic solution to form a leach solution, and passing a volume of sulphur dioxide gas through that leach solution, whereby the levels of dithionate ion generated in the leach solution are less than about 5g/l.
2. A process according to claim 1, wherein the levels of dithionate ion generated in the leach solution are less than about 1g/l.
3. A process according to claim 1 or 2, wherein the pH of the leach solution is maintained at less than about 1.5.
4. A process according to any one of the preceding claims, wherein the leach solution comprises a slurry of manganese dioxide containing material at a slurry density of less than about 10%w/v, less than about 120g/l manganese sulphate, a temperature of greater than about 95°C, and at a pH of less than about 1.5.
5. A process according to any one of the preceding claims, wherein the manganese dioxide containing feedstock contains less than about 40% manganese.
6. A process according to any one of the preceding claims, wherein the leach solution has an initial soluble iron concentration of greater than 4g/l.
7. A process according to claim 6, wherein the iron is in the form of ferric sulphate ($\text{Fe}_2(\text{SO}_4)_3$).
8. A process according to any one of the preceding claims, wherein the ferrous concentration is maintained at a level below about 0.5g/l by

providing an excess or residual amount of manganese dioxide in the slurry.

5 9. A process according to any one of the preceding claims, wherein the ratio of ferric to ferrous is monitored at least at intervals throughout the leach to ensure an oxidation reduction potential (ORP) of 550mV, or above (vs Ag/AgCl reference electrode).

10 10. A process according to any one of the preceding claims, wherein the sulphur dioxide gas is preferably passed through the leach solution over a period of at least 10 hours whereby up to about 95% of manganese dioxide is dissolved.

11. A process according to any one of the preceding claims, wherein the leach is conducted over a period of between about 10 to 15 hours.

15 12. A process according to any one of the preceding claims, wherein once a stoichiometric amount of sulphur dioxide has been added to the leach solution to achieve a 95% dissolution of the manganese dioxide present, the reaction is halted.

20 13. A process for the production of electrolytic manganese dioxide, the process characterised by a leach of a manganese dioxide containing feedstock in acidic solution, through which a volume of sulphur dioxide gas is passed, and in which dithionate ion levels are maintained at less than about 5g/l, the resulting leach solution being processed to provide an appropriate electrolyte that is passed to an electrowinning stage during which electrolytic manganese dioxide is deposited.

25 14. A process according to claim 13, wherein the levels of dithionate ion generated in the leach solution are less than about 1g/l.

15. A process according to claim 13 or 14, wherein the pH of the leach solution is maintained at less than about 1.5.

- 16.A process according to any one of claims 13 to 15, wherein the leach solution comprises a slurry of manganese dioxide containing material at a slurry density of less than about 10%w/v, less than about 120g/l manganese sulphate, a temperature of greater than about 95°C, and at a pH of less than about 1.5.
- 17.A process according to any one of claims 13 to 16, wherein the manganese dioxide containing feedstock contains less than 40% manganese.
- 18.A process according to any one of claims 13 to 17, wherein the leach solution has an initial soluble iron concentration of greater than 4g/l.
- 19.A process according to claim 18, wherein the iron is in the form of ferric sulphate ($\text{Fe}_2(\text{SO}_4)_3$).
- 20.A process according to any one of claims 13 to 19, wherein the ferrous concentration is maintained at a level below about 0.5g/l by providing an excess or residual amount of manganese dioxide in the slurry.
- 21.A process according to any one of claims 13 to 20, wherein the ratio of ferric to ferrous is monitored throughout the leach to ensure an oxidation reduction potential (ORP) of 550mV, or above (vs Ag/AgCl reference electrode).
- 22.A process according to any one of claims 13 to 21, wherein the sulphur dioxide gas is passed through the leach solution over a period of at least 10 hours whereby up to about 95% of manganese dioxide is dissolved.
- 23.A process according to any one of claims 13 to 22, wherein the leach is conducted over a period of between about 10 to 15 hours.
- 24.A process according to any one of claims 13 to 23, wherein once a stoichiometric amount of sulphur dioxide has been added to the leach

solution to achieve a 95% dissolution of the manganese dioxide present, the reaction is halted.

5 25. A process according to any one of claims 13 to 24, wherein the acidic solution used in the leach is at least in part comprised of return or spent sulphuric acid solution from the electrowinning stage.

26. A process according to any one of claims 13 to 25, wherein additional acid is added to the leach to ensure the pH remains less than about 1.5.

10 27. A process for the hydrometallurgical processing of manganese containing materials, the process substantially as hereinbefore described with reference to the accompanying figures.

28. A process for the production of electrolytic manganese dioxide, the process substantially as hereinbefore described with reference to the accompanying figures.